

TuePS25

Upgrade of the Beam Extraction System of the GTS-LHC Electron Cyclotron Resonance Ion Source at CERN

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Linac3 is the first accelerator in the heavy ion injector chain of the Large Hadron Collider (LHC), providing multiply charged heavy ion beams for the CERN experimental program. The ion beams are produced with GTS-LHC, a 14.5 GHz Electron Cyclotron Resonance Ion Source (ECRIS), operated in afterglow mode. Improvement of the GTS-LHC beam formation and beam transport along Linac3 is part of the upgrade program of the injector chain in preparation for the future High Luminosity LHC (HL-LHC).

A mismatch between the ion beam properties in the ion source extraction region and the acceptance of the following Low Energy Beam Transport (LEBT) section has been identified as one of the factors limiting the Linac3 performance. The installation of a new focusing element, an einzel lens, into the GTS-LHC extraction region is foreseen as a part of the Linac3 upgrade, as well as a redesign of the first section of the LEBT. Details of the upgrade and results of a beam dynamics study of the extraction region and LEBT modifications will be presented.